METHOD AND APPARATUS FOR PERFORMING HANDOVER AND RE-ESTABLISHMENT OF CONNECTIONS

BACKGROUND

[0001] 1. Field

[0002] Embodiments of the invention relate to performing handover and re-establishment of connections in dual-connectivity operation.

[0003] 2. Description of the Related Art

[0004] Long-term Evolution (LTE) is a standard for wireless communication that seeks to provide improved speed and capacity for wireless communications by using new modulation/signal processing techniques. The standard was proposed by the 3 Generation Partnership Project (3GPP), and is based upon previous network technologies. Since its inception, LTE has seen extensive deployment in a wide variety of contexts involving the communication of data.

SUMMARY

[0005] According to a first embodiment, a method can include detecting, by a user equipment, that a signaling strength of a first network entity has dropped below a threshold. The method can also include transmitting a measurement report to the first network entity. The method can also include receiving radio-resource-control reconfiguration information from the first network entity. The method can also include transmitting a scheduling request to a second network entity. A Random-access-channel procedure can be avoided.

[0006] In the method of the first embodiment, the first network entity can include a master evolved-Node-B, and the second network entity can include a secondary evolved-Node-B.

[0007] In the method of the first embodiment, the receiving includes receiving a timing-advance value and mobility information.

[0008] In the method of the first embodiment, the timing-advance value corresponds to a timing-advance value of a cell of the second network entity.

[0009] According to a second embodiment, an apparatus can include at least one processor. The apparatus can also include at least one memory including computer program code. The at least one memory and the computer program code can be configured, with the at least one processor, to cause the apparatus at least to detect that a signaling strength of a first network entity has dropped below a threshold. The apparatus can also be caused to transmit a measurement report to the first network entity. The apparatus can also be caused to receive radio-resource-control reconfiguration information from the first network entity. The apparatus can also be caused to transmit a scheduling request to a second network entity. A random-access-channel procedure can be avoided.

[0010] In the apparatus of the second embodiment, the first network entity includes a master evolved-Node-B, and the second network entity includes a secondary evolved-Node-B.

[0011] In the apparatus of the second embodiment, the receiving includes receiving a timing-advance value and mobility information.

[0012] In the apparatus of the second embodiment, the timing-advance value corresponds to a timing-advance value of a cell of the second network entity.

[0013] According to a third embodiment, a method can include receiving, by a first network entity, a measurement report from a user equipment. The method can also include determining to handover a radio-resource-control connection from the first network entity to a second network entity. The method can also include performing handover preparation with the second network entity. The method can also include retrieving a timing advance value from the second network entity. The method can also include transmitting radio-resource-control reconfiguration information to a user equipment. The radio-resource-control reconfiguration information can include the timing advance value and mobility information.

[0014] In the method of the third embodiment, the first network entity includes a master evolved-Node-B, and the second network entity includes a secondary evolved-Node-B.

[0015] In the method of the third embodiment, the timing-advance value corresponds to a timing-advance value of a cell of the second network entity.

[0016] According to a fourth embodiment, an apparatus can include at least one processor. The apparatus can also include at least one memory including computer program code. The at least one memory and the computer program code can be configured, with the at least one processor, to cause the apparatus at least to receive a measurement report from a user equipment. The apparatus can also be caused to determine to handover a radio-resource-control connection from the apparatus to a network entity. The apparatus can also be caused to perform handover preparation with the network entity. The apparatus can also be caused to retrieve a timing advance value from the network entity. The apparatus can also be caused to transmit radio-resource-control reconfiguration information to a user equipment. The radio-resource-control reconfiguration information can include the timing advance value and mobility information.

[0017] In the apparatus of the fourth embodiment, the apparatus includes a master evolved-Node-B, and the network entity includes a secondary evolved-Node-B.

[0018] In the apparatus of the fourth embodiment, the timing-advance value corresponds to a timing-advance value of a cell of the network entity.

[0019] According to a fifth embodiment, a method includes performing, by a second network entity, handover preparation with a first network entity. The method also includes transmitting a timing advance value to the first network entity. The method also includes receiving a scheduling request by a user equipment. A random-access-channel procedure can be avoided.

[0020] In the method of the fifth embodiment, the first network entity includes a master evolved-Node-B, and the second network entity includes a secondary evolved-Node-B.

[0021] In the method of the fifth embodiment, the performing includes transmitting mobility information.

[0022] In the method of the fifth embodiment, the timing-advance value corresponds to a timing-advance value of a cell of the second network entity.

[0023] According to a sixth embodiment, an apparatus can include at least one processor. The apparatus can also include at least one memory including computer program code. The at least one memory and the computer program code can be configured, with the at least one processor, to cause the apparatus at least to perform handover preparation with a network entity. The apparatus can also be caused to transmit a timing advance value to the first network entity. The apparatus can